

Are Any Plants Endemic to Singapore?

RUTH KIEW AND I. M. TURNER

Singapore Botanic Gardens, 1 Cluny Road, Singapore 259569

Abstract

Many taxa are reported in the literature as endemic to Singapore. Of the 19 investigated, seven are shown to be endemic. Of these six, *Bolbitis xsingaporensis* (Lomariopsidaceae), *Flickingeria laciniosa* (Orchidaceae), *Spatholobus ridleyi* (Leguminosae), *Strychnos ridleyi* (Loganiaceae), *Tectaria griffithii* var. *singaporeana* (Dryopteridaceae) and *Thunbergia dasychlamys* (Acanthaceae) are extinct, while *Cryptocoryne xtimahensis* (Araceae) is still alive in the Bukit Timah Nature Reserve. These seven taxa represent a mere 0.3% of Singapore's vascular flora of about 2300 species. A new combination is made for *Hypobathrum coniferum* (Ridl.) Kiew (Rubiaceae).

Introduction

In Ridley's 1900 enumeration of Singapore seed plants, the first listing for Singapore, he noted 33 species as endemic to Singapore although he pointed out that most would probably be discovered in neighbouring countries and this proved to be the case. In addition, he indicated that some names he listed from the literature as coming from Singapore were either invalid names or that Singapore had been wrongly given as the place of origin. (The latter was not an unusual practice in the case of professional plant collectors who did not want the true origin of a valuable plant to be known).

The preparation of the Flora of the Malay Peninsula, initiated at the Calcutta Botanic Garden, but eventually driven by the indefatigable Ridley, both while he was Director of the Botanic Gardens Singapore and later in retirement at the Royal Botanic Gardens, Kew, resulted in the description of many new species, some of which were known only from specimens collected from Singapore. The number of species named in honour of Ridley and the number of rare species that he collected (see Appendix) illustrate his diligence as a collector and that forest in Singapore was much more extensive and less disturbed in his day.

Since that period (1889–1925), a few new species apparently endemic to Singapore have been described often based on very old collections. Significant among these are two hybrids because hybrids often arise and survive in disturbed conditions so they may be a reflection of disturbance in the remaining forested areas in Singapore.

Candidates for Endemic Species

Among the species listed by Ridley (1900), one has proved to be endemic to Singapore. He described *Dendrobium laciniosum*, Orchidaceae (now known as *Flickingeria laciniosa* (Ridl.) A.D.Hawkes) from two plants collected in 1891 from Pulau Seletar. At one time, this species was confused with another orchid from Perlis, Peninsular Malaysia, but Seidenfaden & Wood (1992) believe the Perlis plant to be different. Incidentally, they erroneously record Pulau Seletar as in Johore, Peninsular Malaysia.

Later, Ridley described three more species and a variety as endemic to Singapore: *Didymocarpus perdita* Ridl. (Gesneriaceae), *Dischidia singaporensis* Ridl. (Asclepiadaceae), *Petunga conifera* Ridl. (Rubiaceae) and *Spatholobus ferrugineus* (Zoll. & Moritz) Benth. var. *sericophyllus* Ridl. (Leguminosae).

Didymocarpus perdita collected from Seletar in 1889, Ridley (1923) described as 'very rare, only 2 specimens seen in a ravine, now probably extinct'. This species has proved to be the same as *D. punctulata* Ridl. (now known as *Henckelia punctulata* (Ridl.) A. Weber), which grows in southern and eastern Peninsular Malaysia (Kiew, 1987).

Dischidia singaporensis is similarly a very rare species known only from one collection from the Changi Police Station in 1908. Later, *D. singaporensis* was collected from Endau-Rompin, Johore (Kiew, 1987).

Petunga conifera, now known as *Hypobathrum coniferum* (Ridl.) Kiew (see Appendix), in Ridley's time was known from a single tree in the Botanic Gardens Rain Forest, which at that time was called the Gardens Jungle (Ridley, 1923). Later, a specimen of this species was collected from Johore, disproving its status as endemic to Singapore. However, considering its extreme rarity and that it has not been recollected for more than a hundred years, it can be concluded that the Singapore population of this species is extinct.

Spatholobus ferrugineus var. *sericophyllus* was originally described from four collections from Singapore (Ridley, 1922). However, this variety has since proved to be widespread (Ridder-Numan & Wiriadinata, 1985). In Peninsular Malaysia, for example, it has been collected from Perak, Selangor, Malacca and Negri Sembilan.

From publications from Calcutta, five new species were described that were then known only from specimens collected in Singapore: *Litsea ridleyi* Gamble (Lauraceae), *Piper flavimarginatum* C.DC. (Piperaceae), *Polyosma ridleyi* King, *Spatholobus ridleyi* Prain ex King (Leguminosae) and *Strychnos ridleyi* King & Gamble (Loganiaceae).

Litsea ridleyi, first collected in the 1880s, has been sporadically collected since, the latest being in 1982 from the Bukit Timah Nature Reserve. However, several specimens from Borneo (for example, *Ridley s.n.* 1892 from Bongaya and *Senada Brunei 54121* from Baram) are conspecific with this species, which is therefore not

endemic to Singapore.

Ridley (1924) reported the wild pepper, *Piper flavimarginatum* as only from Singapore, where he described it as 'very common but rarely flowering'. However, it is widespread though not common in Peninsular Malaysia and has been collected from as far afield as Langkawi, Perak, Pahang, Trengganu, Negri Sembilan and Johore. It can therefore no longer be considered endemic to Singapore. It has not been recollected in Singapore since 1933.

Another rare endemic, *Polyosma ridleyi* King (Escalloniaceae), was known from a collection made by Ridley in 1892 from Seletar and another by Cantley in the 1880s without the locality specified. Much later it was shown by Saw (1989) to occur in Johore and Brunei as well as Singapore.

Spatholobus ridleyi is a distinctive species. It has only been collected from Singapore on three occasions and from nowhere else. It was last collected in 1899 and is an example of a rare Singapore endemic that is now extinct.

Strychnos ridleyi is known from just two specimens, both from Singapore, the last collected in 1894. Ridley (1923) reported that it was 'very rare in forests'. The most recent revision for the region by Leenhouts (1962) confirmed it as a valid species. *S. ridleyi* is another example of a rare Singapore endemic species that is now extinct.

In the post-war period, new species were sporadically described either because genera were being revised, such as the ferns *Bolbitis singaporensis* Holttum (Lomariopsidaceae) and *Tectaria griffithii* (Baker) C.Ch. var. *singaporeana* Holttum (Dryopteridaceae); *Thunbergia dasychlamys* Bremek. (Acanthaceae); *Psychotria* 'sp. 9' K.M.Wong (Rubiaceae) or, in one case, was recently discovered, *Cryptocoryne xtimahensis* Bastmeijer (Araceae).

In 1947, Holttum described the fern *Bolbitis singaporensis* and noted that it looked like a hybrid between what are now called *Bolbitis appendiculata* (Willd.) K.Iwatsuki ssp. *appendiculata* and *B. sinuata* (C. Presl) Hennipman that all grew together in one valley on Bukit Timah. In 1978, Hennipman formally designated this fern as a hybrid, *Bolbitis xsingaporensis* Holttum. As it is only known from Singapore, it is an endemic. Wee (1984) reported that it has not been seen 'for a very long time'. It was last collected in 1943. It is probably now extinct.

The case of the fern, *Tectaria griffithii* var. *singaporeana* is different. This variety was only ever known from a single plant collected in 1908 from Bukit Timah. The fact that it was not recollected by Holttum, who made an intensive study of ferns in Singapore, nor by other botanists suggests that it was a single aberrant plant that does not warrant taxonomic status.

Thunbergia dasychlamys, a slender climber, is extremely rare and known from only two specimens from Singapore, both collected by Ridley. It has not been recollected since 1906. It is therefore a Singapore endemic, which is now extinct.

Psychotria malayana Jack is a common and widespread species with fruits that dry conspicuously ribbed. However, some specimens that have fruits that are almost smooth and leaves that are broader and the base not tapered into the petiole were segregated from *P. malayana* by E.D. Merrill as recorded on his determination slips dated 1950 on the specimens. These specimens were formally recognised as distinct by Wong (1989) under the name *Psychotria* 'sp. 9'. The status of this taxon requires detailed investigation to decide whether *Psychotria* 'sp. 9' is in fact a distinct taxon or whether it is a southern form of *P. malayana*, something that is beyond the scope of this study. It is not, however, endemic to Singapore as Merrill assigned a specimen from Malacca (*Ridley s.n.* June 1892 from Gunung Mereng) to this taxon. In Singapore, this taxon was collected from several localities giving the impression that it was not rare. However, there are no specimens collected after 1906, which strongly suggests that the Singapore population is now extinct.

Recently, Bastmeijer & Kiew (2001) described a new hybrid from Singapore, *Cryptocoryne xtimahensis* Bastmeijer (Araceae) from the Bukit Timah Nature Reserve. Its present status is endemic to Singapore as it has not been collected from elsewhere, but considering how readily species of *Cryptocoryne* hybridise, it is likely that in future it will be encountered in southern Peninsular Malaysia, where both the putative parents grow.

Keng (1990) in his flora of Singapore cited two species, *Polyosma kingiana* Schltr. (Escalloniaceae) and *Sabia erratica* P.M. v.d. Water (Sabiaceae) as endemic to Singapore and both were listed as 'strictly endemic to Singapore' in Davis *et al.* (1995). The inclusion of *P. kingiana* appears to be an error as this species, together with the name it was originally described under, *P. flavo-virens* Ridl., was not recorded from Singapore by Ridley (1922).

The case of *Sabia erratica* is an interesting one as van de Water (1980) clearly stated in describing the species that the label on the type specimen at Kew, which gave its origin as Bukit Timah, was clearly the wrong one as it described the plant as a tree 30 m tall whereas *Sabia* is a genus of climbers. The data on the label recorded the collector as Ngadiman (not Ngadiwan as given by van de Water) with the Field Number 36149 (which is a Singapore Field Number, not a Kepong number as reported by van de Water), collected from Tree No. 454 in Bukit Timah on 22 May 1940 and the specimen was identified as *Scaphium* (Sterculiaceae). The collection belonging to this label is in the Singapore Herbarium (SING) and represents a specimen of *Scaphium macropodum* (Miq.) Beumee *ex* Heyne, which is indeed a tree. The type specimen of *Sabia* was distributed from Kepong to Kew and at some point the label from the *Scaphium* specimen was attached to the *Sabia* specimen. Van de Water commemorated this mix-up in the specific epithet 'erratica' meaning wandering.

Since *Sabia erratica* was described, two other specimens have been identified at Kew as belonging to this species. They are *Makoto Togashi* 622240 collected from

Cameron Highlands, Pahang, at 6500 feet on 1 Feb 1962 and *T & P 614* collected from the Palas Tea Estate, Gunung Brinchang, Cameron Highlands, on 1 April 1979. There is a duplicate of the latter specimen in SING. It is therefore now clear that *Sabia erratica* is a very rare endemic from Cameron Highlands (probably confined to Gunung Brinchang) and is not found in Singapore.

The status of *Hanguana* ‘Singapur’ (Hanguanaceae) suggested as a possible new taxon (Tillich & Sill, 1999) is discussed in the Appendix. It is not endemic.

Discussion

Out of the potential candidates, only seven can be considered endemics (Table 1). As mention above, two are hybrids that may have resulted from disturbance to the natural habitats in the last hundred years. One variety, *Tectaria griffithii* var. *singaporeana*, is doubtfully valid taxonomically as it is based on a single plant.

Singapore does not in fact possess a flora that is distinct from the surrounding region but is a part of the flora found in southern Johore as well as showing affinities with the northern flora of Borneo. The endemic status of the species in Table 1 may not stand the test of time as the flora of Johore is relatively poorly collected compared with that of Singapore and it is likely that these species also occur there.

It is interesting that three endemics are climbers, the life form most poorly represented in herbaria, because of the inaccessibility of their foliage, flowers and fruits high up in the canopy. Their endemic status in Singapore may therefore be an artefact of more intensive collecting. (Singapore has always had more botanists per km² than any other country in the region). If a search is carried out in neighbouring countries, these climbers can be expected to be found.

Table 1. Endemic species in Singapore

Species	Life form	No. localities & date last collected		Status
<i>Bolbitis xsingaporensis</i>	fern	1	1943	extinct
<i>Flickingeria laciniosa</i>	epiphyte	1	1891	extinct
<i>Spatholobus ridleyi</i>	climber	2	1899	extinct
<i>Strychnos ridleyi</i>	climber	2	1894	extinct
<i>Thunbergia dasychlamys</i>	climber	2	1906	extinct
<i>Tectaria griffithii</i> var. <i>singaporeana</i>	fern	1	1908	extinct
<i>Cryptocoryne xtimahensis</i>	aquatic	1		extant

Most of these endemic species were always very rare and are known from only one or two localities. Their extreme rarity meant that habitat destruction or disturbance would tip them into extinction. Most of this extinction apparently occurred about a hundred years ago as Singapore was intensively botanised in the 1920s and 1930s without these species being re-collected. Now only one of the seven still survives.

Seven endemics for a flora of about 2300 species of vascular plants represents a very low level of endemism (0.3%), though it is higher (1.6%) if just ferns are considered. One would not expect the Singapore flora to include a large number of endemics as Singapore lacks many of the most biodiverse habitats with high endemism of the region, such as mountains, limestone hills and ultramafic areas.

Conclusion

This survey shows that seven species are endemic to Singapore and that of these six, *Bolbitis xsingaporensis*, *Flickingeria laciniosa*, *Spatholobus ridleyi*, *Strychnos ridleyi*, *Tectaria griffithii* var. *singaporeana* and *Thunbergia dasyclamys*, are extinct; only *Cryptocoryne xtimahensis* is still alive in the Bukit Timah Nature Reserve.

The other eight species thought at one time to be endemic have been shown, as regional floras have become better known, to have a wider distribution and grow outside Singapore. Seven of these were always very rare and have not been re-collected in Singapore for many years, which indicates that their Singapore population is extinct, although the species continues to survive elsewhere. These include *Dischidia singaporensis*, *Henckelia puncticulata*, *Hypobathrum coniferum*, *Piper flavimarginatum*, *Polyosma ridleyi*, *Psychotria* 'sp. 9' and *Spatholobus ferrugineus* var. *sericophyllus*. A population of the eighth, *Litsea ridleyi*, still survives in Singapore in the Bukit Timah Nature Reserve but is very rare (Maxwell, 1983).

The presence of the one extant endemic taxa and one rare species in the Central Catchment Reserve reinforces its value as a protected conservation area for the biodiversity of Singapore. The hybrid endemic to Singapore, *Cryptocoryne xtimahensis*, grows in two adjacent small pools within the Bukit Timah Nature Reserve. Its long-term survival is therefore vulnerable to any hydrological changes to that one stream. Active monitoring and management, particularly in dry periods, is therefore important.

Acknowledgements

This survey was prompted by Saifuddin Suran's enquiry as to the status of the 'endemic' species mentioned in the *Centres of Plant Diversity* book. We thank Josef Bogner for drawing our attention to the *Hanguana* 'Singapur'; S. Chan for permission to work in the Bukit Timah Nature Reserve; Saw L. G. for information on *Sabia* specimens at Kepong; C. Chia and Saifuddin Suran, Biodiversity Centre, NParks, for searching for

the location of Pulau Terijei; J.F. Veldkamp for help with tracing *Hypobathrum* names; and the Keeper of Herbarium at Kew for permission for R. Kiew to study specimens in his care, and to Lena Chan for comments on the manuscript.

References

- Bastmeijer, J.D. and R. Kiew. 2001. A new *Cryptocoryne* hybrid (Araceae) from Bukit Timah Nature Reserve, Singapore. *Gardens' Bulletin Singapore*. **53**: 9–17.
- Davis, S.D., V.H. Heywood and A.C. Hamilton. 1995. *Centres of Plant Diversity*. Vol. 2. Asia, Australasia and the Pacific. WWF and IUCN, U.K.
- Keng, H. 1990. *The Concise Flora of Singapore. Gymnosperms and Dicotyledons*. Singapore University Press, Singapore.
- Kiew, R. 1987. The herbaceous flora of Ulu Endau, Johore-Pahang, Malaysia, including taxonomic notes and descriptions of new species. *Malayan Nature Journal*. **41**: 201–234.
- Leenhouts, P.W. 1962. Loganiaceae. *Flora Malesiana*. I, **6**: 293–387.
- Maxwell, J.F. 1983. New and interesting plant records for Singapore. *Gardens' Bulletin Singapore*. **35**: 191–198.
- Ridder-Numan, J.W.A. and H. Wiriadinata. 1985. A revision of the genus *Spatholobus* (Leguminosae-Papilionoideae). *Reinwardtia*. **10**: 139–205.
- Ridley, H.N. 1900. The flora of Singapore. *Journal of the Straits Branch of the Royal Asiatic Society*. **35**: 27–196.
- Ridley, H.N. 1922. *Flora of the Malay Peninsula*. Vol. 1. Reeve, U.K.
- Ridley, H. N. 1923. *Flora of the Malay Peninsula*. Vol. 2. Reeve, U.K.
- Ridley, H.N. 1924. *Flora of the Malay Peninsula*. Vol. 3. Reeve, U.K.
- Rintz, R.E. 1980. The Peninsular Malaysian species of *Dischidia* (Asclepiadaceae). *Blumea*. **26**: 81–126.

Saw, L.G. 1989. *Sabiaceae*. *Tree Flora of Malaya*. **4**: 426–431.

Seidenfaden, G. and J.J. Wood. 1992. *The Orchids of Peninsular Malaysia and Singapore*. Olsen & Olsen, Denmark.

Tillich, H.-J. and E. Sill. 1999. Systematische Studien zur Morphologie und Anatomie von *Hanguana* Blume (Hanguanaceae) und *Flagellaria* L. (Flagellariaceae), mit der Beschreibung einer neuer Art, *Hanguana bogneri* spec. nov. *Sendtnera*. **6**: 215–238.

Water, Th.P.M. van de. 1980. A revision of *Sabia* (Sabiaceae). *Blumea*. **26**: 1–64.

Wee, Y.C. 1984. *Common Ferns and Fern-Allies of Singapore*. Malayan Nature Society (Singapore Branch), Singapore.

Wong, K.M. 1989. *Psychotria*. *Tree Flora of Malaya*. **4**: 396–399.

Appendix: Taxonomic notes with the inclusion of specimens in the Singapore Herbarium (SING).

Bolbitis xsingaporensis Holttum

Basionym: *Bolbitis singaporensis* Holttum. Gard. Bull. Str. Settl. 11 (1947) 271.

Type: Bukit Timah – *Hullett s.n.* March 1882 (holo SING, iso SING).

Other specimens: Bukit Timah – *C.G. Matthew 12567* 1906 (SING), *Holttum s.n.* 27 Feb 1923 (SING), *Holttum SFN 19799* 12 Nov 1928 (SING), *Holttum s.n.* 12 Dec 1928 (SING), *Holttum s.n.* Feb 1943 (SING).

Cryptocoryne xtimahensis Bastmeijer. Gard. Bull. Singapore. 53 (2001) 11.

Type: Bukit Timah – *Kiew et al. RK 5127* (holo SING).

Other specimen: Bukit Timah – *P. Blanc 91-1* (SING).

Dischidia singaporensis Ridl. J. Str. Br. Roy. As. Soc. 61 (1912) 31.

Type: Changi Police Station – *Ridley s.n.* 1908 (lecto SING).

Note: The other specimen Ridley listed as belonging to this species, Rintz (1980) identified as *Hoya lacunosa* Bl.

Flickingeria laciniosa (Ridl.) A.D.Hawkes.

Basionym: *Dendrobium laciniosum* Ridl. J. Linn. Soc. 32 (1896) 242.

Type: Pulau Seletar – *Ridley s.n.* 1891 (holo SING).

Other specimen: Pulau Seletar – *Goodenough s.n.* 1891 (SING).

Hanguana ‘Singapur’

Josef Bogner (letter dated 5th Nov 2002) suggested that the Bukit Timah population of *Hanguana*, based on his observations of a sterile plant in the Munich Botanic Garden grown from seed collected in Bukit Timah, may be a new species, because unlike *H. malayana* (Jack) Merr. (Hanguanaceae) with which it had previously been identified, it was much smaller and did not produce long runners with young plants at the tip. Tillich & Sill (1999) compared the morphology and anatomy of this sterile plant, which they called *H. ‘Singapur’*, with three other *Hanguana* species from Borneo, *H. major* Airy Shaw, *H. bogneri* Tillich & Sill and *H. ‘Borneo’*. However, they did not compare the Bukit Timah plant with *H. malayana*.

Hanguana malayana can be a confusing species as its extreme forms look very different. Plants that grow on lake or pond margins are robust plants that produce long runners (the aquatic form), while plants that grow in forest in wet hollows or on slopes (the terrestrial form) are more slender plants and their runners are much shorter. However, since there are so many plants that are intermediate between these two forms, Backer (1951) and Backer & Bakhuizen van den Brink (1968) concluded that the aquatic and terrestrial forms belonged to a single variable species. Unfortunately, neither of these characters (length of runners and robustness of the plant) can be seen on herbarium specimens and data on labels is also usually lacking.

In deciding whether the Bukit Timah population represents a new species, it was necessary to compare it with the complete range of variation in *Hanguana malayana* from the aquatic to the terrestrial form. To this end, a study was initiated to find, firstly, a suite of characters that can be examined from herbarium specimens, that can be used to assess whether the terrestrial form is different from the aquatic one in any characters other than robustness and runner length, and, secondly, to test whether the Bukit Timah population, which grows in forest, falls within the range of variation of either of these forms. This study was carried out by R. Kiew, A.T. Gwee, P.K.F. Leong, Mohd Shah Mohd Noor and Samsuri Ahmad.

Based on the literature, eleven characters were selected that could possibly separate the two forms, namely, leaf shape (ensiform v. lanceolate), indumentum (hairy v. glabrous), petiole (present or absent), lamina length, width, and the ratio of width to length, lamina tip (acute v. acuminate), inflorescence length (excluding stalk length), length of lowest inflorescence branch, indumentum of inflorescence, fruit shape (globose or fusiform) and fruit length. These were tested on herbarium specimens of both forms from Peninsular Malaysia.

As with previous studies (Backer, 1951; Backer & Bakhuizen van den Brink, 1968), no character could be identified that would reliably separate the aquatic from the terrestrial form. The characters either showed continuous variation, such as lamina

length and width or inflorescence length, or, if disjunct, such as fruit shape, did not correlate with other characters.

The Bukit Timah *Hanguana* population grows in forest along streams and on slopes, i.e. the habitat of the terrestrial form. Fertile specimens in the Bukit Timah population were examined in the field for nine characters (leaf shape, leaf tip, petiole and lamina length, lamina width, inflorescence length, length of the lowest inflorescence branch, fruit shape and length). Results showed conclusively that they fell within the range of the Peninsular Malaysian population although in lamina length, they were in the lower range (mean length 57 cm, range 41–118 cm) compared with mean length 76 cm, range 20.5–153 cm for *H. malayana* in Peninsular Malaysia. Their smaller size might be explained by the nutrient-poor habitat of most of the population, which grows on the coarse sand in an eroded streambed. Those on the slope above the stream where there is a litter layer are larger plants but nevertheless still fall within the range of variation seen in Peninsular Malaysia. There was no difference for the other characters between the Bukit Timah and Peninsular Malaysian populations. A few plants growing in water on the streambed had short runners up to 20 cm long.

This study therefore shows that the suggestion by Bogner that the Singapore population of *Hanguana* represents a new species cannot be upheld as it falls within the range of variation seen in *H. malayana*.

Backer, C.A. 1951. *Hanguana*. *Flora Malesiana*. Ser. 1. 4: 248–250.

Backer, CA. and R.C. Bakhuizen van den Brink. 1968. *Hanguana*. *Flora of Java*. 3: 23–24.

Henckelia puncticulata (Ridl.) A. Weber.

Synonym: *Didymocarpus perdita* Ridl. J. Str. Br. Roy. As. Soc. 44 (1905) 54.

Type: Seletar – Ridley *s.n.* 3 Nov 1889. (holo SING).

Hypobathrum coniferum (Ridl.) Kiew, *comb. nov.*

Basionym: *Petunga conifera* Ridl. J. Str. Br. Roy. As. Soc. 79 (1918) 81; Ridl. Fl. Mal. Pen. 2 (1923) 85.

Synonym: *Hypobathrum* sp. 11 K.M.Wong. Tree Fl. Mal. 4 (1989) 355.

Invalid name: *Hypobathrum coniferum* Bakh.f. in Keng, Concise Flora of Singapore Gymnosperms and Dicotyledons (1990) 156.

Type: Singapore – Gardens Jungle Ridley 10722 1899 (holo SING).

Notes: Bakhuizen *f.* never published the combination cited by Keng, which is therefore invalid. *Hypobathrum coniferum* resembles *H. venulosum* (Hook.f.) K.M.Wong but differs in its very short inflorescences (up to 1.5 cm long) and its larger and broader

leaves with more veins (15–18 x 6–7 cm with 7–9 veins) whereas *H. venulosum* has long inflorescences up to 8 cm long and leaves 9–13 x 3.5–5 cm with 5–7 pairs of veins. *H. coniferum* is therefore a valid species. All three specimens of *H. coniferum* were collected in flower so its fruit remains unknown.

Other specimens: Singapore – Gardens Jungle Ridley 8427 April 1897 (SING); Peninsular Malaysia – Johore, Sungai Kayu Kiah SFN 32366 10 March 1937 (SING).

Litsea ridleyi Gamble. Kew Bull. (1910) 317.

Type: Reservoir Wood - Ridley 5101 1893 (lecto SING (flowers), here designated).

Other specimens: Singapore (no locality) - Cantley s.n. 1880s (SING); Botanic Gardens - Cantley 193 (SING); Gardens Jungle Hill H1038 11 Aug 1970 (SING); Chan Chu Kang - Ridley s.n. 1894 (SING); Changi - Goodenough 3803 1892 (SING); Bukit Mandai - Ridley 3836 1892 (SING), Ridley 4701 1892 (SING), Goodenough 5064 1893 (SING), Ridley 10833 22 May 1900 (SING); Holland Road - Hullett s.n. 22 May 1893 (SING); Bukit Timah Nature Reserve - Hamzah Tambi H23 14 July 1971 (SING), Mohd Noor MN1878 22 April 1974 (SING), Shah & Samsuri 3946 1976 (SING), Maxwell 82-61 28 Feb 1982 (SING).

Notes: Among the Peninsular Malaysian species, it most resembles *Litsea accedens* Bl. (syn. *L. singaporensis* Gamble) in leaf and inflorescence characters but the latter species is distinct in its fine reticulations that in dried leaves are raised.

The description in Ridley's flora (1924) contains an error for petiole length, which he describes as 0.15 inches long, when Gamble (1910) originally described it as 1.5 cm long.

Piper flavimarginatum C.DC. Rec. Bot. Survey India. 4 (1912) 26.

Type: Chan-chu-kan Ridley 3772.

Other specimens: Bukit Timah – Ridley s.n. 1899 (SING), Corner SFN 3499 19 June 1938 (SING); Jurong – Corner s.n. 17 April 1933 (SING).

Polyosma ridleyi King. J. As. Soc. Beng. 66 (1897) 304.

Type: Seletar Ridley 3972 1892 (iso SING).

Note: Known from a single collection.

Psychotria 'sp. 9' K.M.Wong. Tree Fl. Mal. 4 (1989) 398.

Specimens: Singapore (without locality) - Cantley 2807 1880s (SING), Ridley 11272 1901 (SING); Chan Chu Kang - Hullett s.n. 1896 (SING); Bukit Mandai - Ridley 6556 1894 (SING); Bukit Panjang (?Puyan) Ridley 12530 1906 (SING); Bukit Timah - Ridley 11238 21 Oct 1900 (SING); Bukit Timah Road - Ridley 904 (SING); Jurong - Ridley 8422 March 1891 (SING).